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(71) Applicants
Valor Heating Limited,
Wood Lane, Erdington,
Birmingham B24 9QP
(72) Inventor
Dennis Tongue
(74) Agents
Marks & Clerk, Alpha
Tower, ATV Centre,
Birmingham B1 1TT

(54) Gas fire elements

(57) A method of making a ceramic radiant heating element comprises placing a quantity of mouldable ceramic material between two tools, one tool 15 having a number of irregularly spaced recesses 16 and the other tool 17 having correspondingly positioned projections 18, bringing the tools 15, 17 together to define a cavity in which the mouldable material is pressed to form an element 10 with a flat part and recesses 14 and projections 13 corresponding with those on the tools 15, 17 the tool 17 having formations 19 to form perforations 12 in the element, and heating to solidify the ceramic material before removal of the completed element.

FIG. 3.

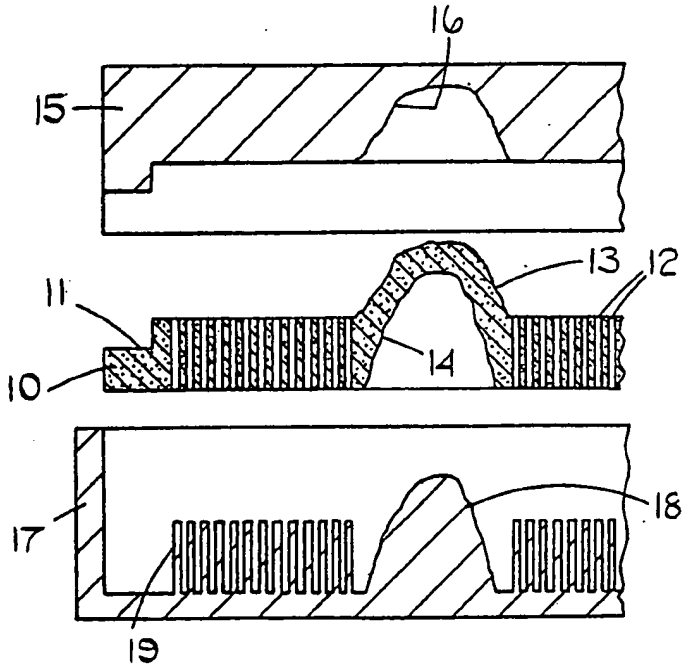

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FIG.1.

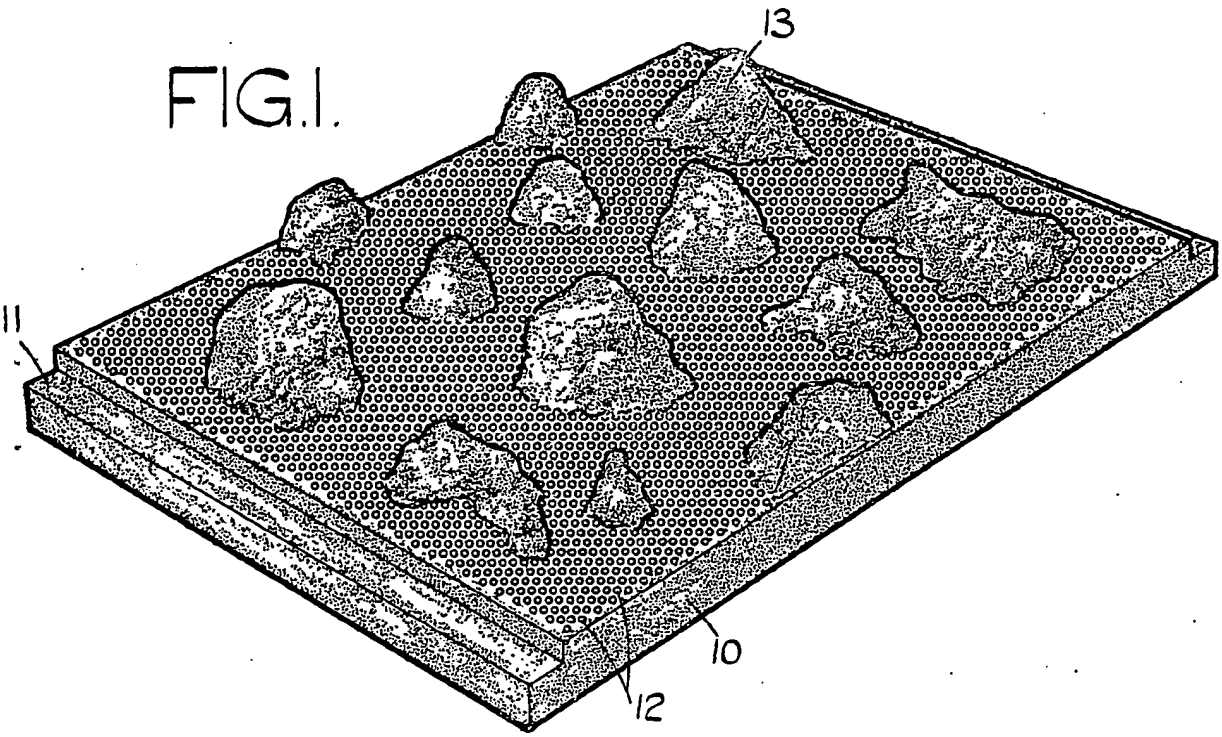


FIG.3.

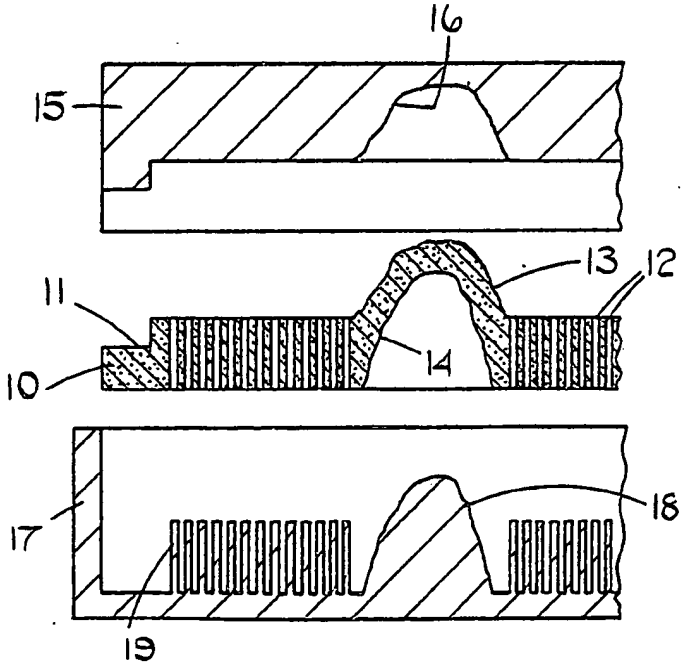
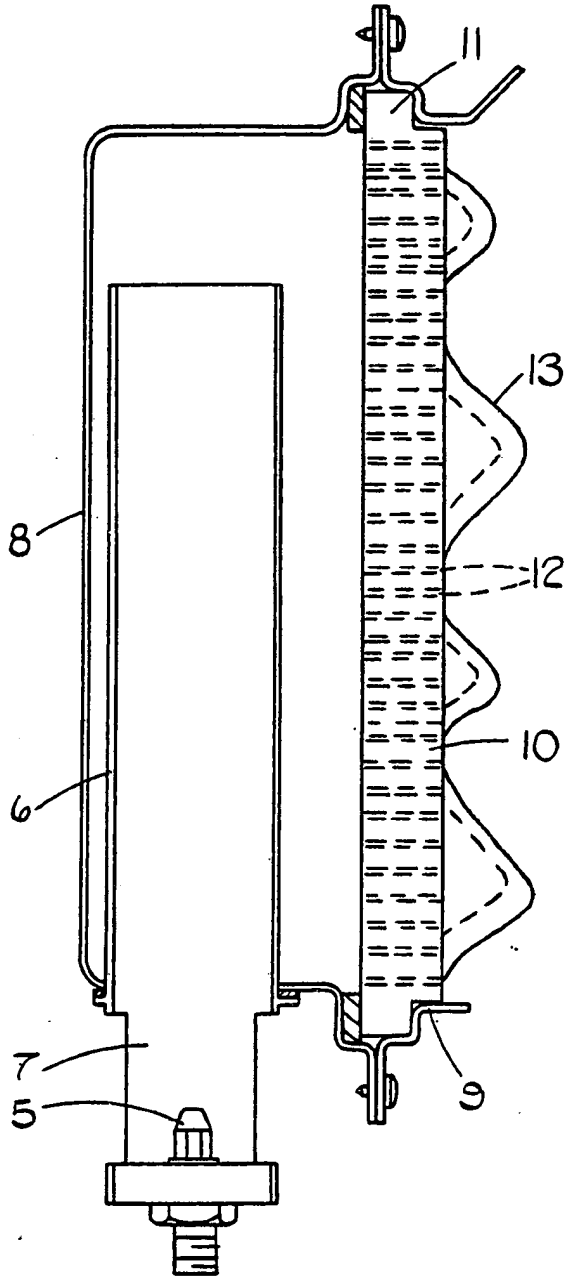


FIG.2.



SPECIFICATION

Gas fire elements

This invention relates to radiant heating elements for gas fires. In particular, but not essentially the invention is concerned with such elements for use in liquid petroleum gas heater appliances.

Liquid petroleum gas is usually stored in a bottle, in liquefied form, the gas being supplied under pressure, to perforated ceramic elements, the elements being heated by burning of the gas at the front surfaces of the elements, at a temperature at which they will radiate a significant amount of the heat produced, this being usually a temperature at which the elements will glow red. This is generally described as a surface combustion burner.

The element is called a plaque type element. This comprises a generally flat ceramic member which in the conventional arrangement, is closely perforated substantially over all of its surface.

It has become common to produce, on a gas heater, the appearance of solid fuel. This has been accomplished, in one example, on a plaque type heater element by moulding protrusions on the front of the plaque during its manufacture. In this example the whole plaque with the protrusions is produced by a vacuum forming process from powdered ceramic material. After forming, some colour is added, particularly to the protrusions, to give a realistic solid fuel-like appearance.

This process tends to be relatively expensive and has some disadvantages in terms of visual effect and also combustion.

The material which must be used for this is less satisfactory than the hard ceramics sometimes used for this type of plaque element. Furthermore, the solid protrusions do not give off the same radiant heat value as the perforated plaque area because of the solid masses created and thus combustion efficiency is reduced as compared with a conventional flat plaque.

With adhesively applied solid fuel effect elements on a flat plaque as described in Patent Application No. 7902954, a satisfactory result is achieved.

It is the object of this invention, however to provide a radiant heating element in which efficiency is good and which is convenient to manufacture.

According to one aspect, the invention resides in a method of producing a ceramic radiant heating element comprising placing a quantity of ceramic material in mouldable form between two relatively movable tools, one of the tools having a plurality of irregularly spaced recesses and the other having a plurality of projections positioned to correspond with the recesses in the said one tool, and bringing the tools together to define a cavity in which the material is pressed into the shape of an element having the irregularly spaced recesses and projections and also defining a flat part, from generally flat side faces of which the recesses and the projections deviate, said tools also containing members for forming perforations in the material within said flat part, heating the materials to cause it to solidify and finally removing the material from the tools.

In accordance with a further aspect, the invention resides in a ceramic radiant heating element produced by the method defined in the preceding paragraph, having a flat perforated part with a plurality of irregular projections and correspondingly positioned recesses deviating from respective opposite generally flat sides thereof.

It is possible, by means of the method described to produce a plaque type element which gives a generally solid fuel effect when in use. Furthermore, the thickness of the material is preferably generally uniform or nearly so over the whole plaque, thus minimising thermally induced stress areas.

The invention will now be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 is a perspective view from above of a radiant heating element constructed in accordance with the invention, and

Figure 2 is a cross-sectional view of an element constructed in accordance with the invention, shown in a complete burner assembly.

Figure 3 is a fragmentary view of the element shown in cross-section with tools for its construction shown also in cross-section.

Figure 1 shows a rectangular plaque for use in a liquid petroleum gas heating appliance. As seen in Figure 2 the plaque is mounted in a burner assembly. In this example this assembly is housed at the front of the appliance and is mounted at an inclination to the vertical. Other mounting arrangements may however be adopted. Liquid petroleum gas stored in a container is supplied to a nozzle 5 in one end of a tube 6 with air entry openings adjacent to the nozzle. The other end of the tube 6 opens into a chamber 7 defined by a metal container 8 and, at one face by the plaque 10. A securing part 9 is used to secure the plaque to the container 8. Gas which is therefore mixed with air and delivered into the chamber escapes through perforations 12 in the plaque. The gas is lit at the front face and the plaque is raised thereby to a temperature at which it will radiate heat. The plaque will usually reach a temperature at which it glows red.

The plaque 10 in this form has end registration shoulders 11 whereby it is retained by the securing part 9 in the appliance. Typically, it is rectangular and has a thickness of the order of $1\frac{1}{4}$ cm being 13 cm long and 9 cm wide.

The greater portions of the front and rear surfaces are substantially flat and between these two surfaces extend a large number of small perforations 12. It is through these perforations that the gas flows. The front surface may have small raised portions (not shown) local to and surrounding the individual holes or to groups of the holes. This is known to provide improved combustion.

On the front surface shown in Figure 1 the plaque has a plurality of irregularly shaped and irregularly spaced projections 13. These are formed integrally with the remainder of the plaque, and at the rear face, a plurality of recesses 14 are formed, each recess corresponding with one of the projections 13. The outer surfaces of the projections are however rougher than the interior surfaces of the recesses 14. The projections 13 form the appearance on the surface of the plaque of pieces of solid fuel, such as coal or coke. They are preferably coloured by the application of inks or paints. Generally black colouring is suitable.

Figure 3 shows tools from which the plaque may be constructed. One of the tools 15 has recesses 16 corresponding in position and shape to the projections 13. The other tool 17 had projections 18 corresponding with the required recesses 14 in the plaque 10. The tool 17 also carried a plurality of pins 19 for forming the perforations 12 in the flat part of the plaque 10.

The tools 15 and 17 can register together to define between them a cavity in which the plaque element is formed.

The process for producing the plaques is to insert between the tools 15 and 17 a quantity of ceramic materials of volume equivalent to that of the finished plaque. This material is either in soft plastic mouldable form or it may be powder. The tools 15 and 17 are brought together and the cavity defined between them is thus completely filled by the material which thus enters the recesses 16 and is displaced by the projections 18 and the pins 19 to form the recesses 14 in the holes 12. Pressure is applied for this purpose and simultaneously or subsequently heating takes place to heat the material to a temperature at which it will solidify. After cooling, the tools are separated and the plaque extracted. The colouring as required is applied after the forming process has been completed.

When in use, the flat part of the plaque tends to glow red, and this colouring is offset by the projections 13 which remain generally black although they rise to high temperature and give off significant radiant heat. The general appearance is therefore similar to that of a solid fuel fire.

CLAIMS

1. A method of producing a ceramic radiant heating element comprising placing a quantity of ceramic material in mouldable form between two relatively movable tools, one of the tools having a plurality of irregularly spaced recesses and the other having a plurality of projections positioned to correspond with the recesses in the said one tool, and bringing the tools together to define a cavity in which the material is pressed into the shape of an element having the irregularly spaced recesses and projections and also defining a flat part, from generally flat side faces of which the recesses and the projections deviate, said tools also containing members for forming perforations in the material within said flat part, heating the material to cause it to solidify and finally removing the material from the tools.

2. A method as claimed in claim 1 wherein the relative sizes of the recesses and projections give portions of the element of thickness generally similar to the thickness of the flat part, or nearly so.

3. A method as claimed in claim 1 or claim 2 wherein the external surfaces of the projections are finally coloured to simulate solid fuel.

4. A ceramic radiant heating element produced by the method as claimed in claim 1 having a flat perforated part with a plurality of irregular projections and correspondingly positioned recesses deviating from respective opposite generally flat sides thereof.

5. A ceramic radiant heating element as claimed in claim 4 wherein the projections and recesses are such that the thickness of the element between them is generally similar to that of the flat part or nearly so.

6. A ceramic radiant heating element as claimed in claim 4 or claim 5 in which the external surfaces of the projections are coloured to simulate solid fuel.

7. A method of producing a ceramic radiant heating element substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

8. A ceramic radiant heating element substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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